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MCGLEW & TUTTLE, PC  
P.O. BOX 9227  
SCARBOROUGH STATION  
SCARBOROUGH, NY 10510-9227

EXAMINER	
GARCIA, ERNESTO	
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3679	

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/632,017  
Filing Date: July 31, 2003  
Appellant(s): ABELS ET AL.

**MAILED**

**NOV 16 2006**

**GROUP 3600**

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John James McGlew  
Brian M. Duncan  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed August 31, 2006 appealing from the Office action mailed December 7, 2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is substantially correct. Claim 28 is now objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

The rejection of claims 1 and 28 as being anticipated by Amrath, 4,639,159, has been withdrawn.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

JP-2-199317*	Yao	8-1990
2,197,037	Gardner	4-1940

\* See English translation provided as an attachment.

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 102***

Claims 1, 5, 9, 10, 12, 14, 17, 20, 23, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Yao, JP-2-199317.

Regarding claim 1, Yao, discloses, in Figures 1, 3 and 4, a ball-and-socket joint comprising a housing 6, a bearing shell 5, a ball pivot 2, a sealing bellows 8, a ball race 13, and a sliding ring A1 (see marked-up attachment; Figure 3). The bearing shell 5 is inserted into the housing 6. The ball pivot 2 with a joint ball 4 is pivotally mounted in all directions in the bearing shell 5. The sealing bellows 8 is between the housing 6 and the ball pivot 2. The sealing bellows 8 has a pivot-side edge area 23. The ball race 13 is fixed on the ball pivot 2. The sliding ring A1 receives the pivot-side edge area 23 of

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the sealing bellows **8**. The sliding ring **A1** is mounted to slide in the ball race **13** and has a sliding face **A9** facing the joint ball **4** arranged adjacent to the ball race **13**. The ball race **13** has a leg **15** (see also "large diameter flange" at page 7, line 3 of English translation) in contact with the sliding ring **A1**. The leg **15** comprising lugs **28** (Fig. 4) arranged at spaced locations from one another.

Regarding claim 5, the sliding ring **A1** includes an axial extension **14** and a radial extension **16**.

Regarding claim 9, the ball race **13** has an approximately U-shaped cross section.

Regarding claim 10, the sealing bellows **8** has a surface **A100** slidably in contact with a surface **A20** of the ball race **13**.

Regarding claim 12, the surface **A100** of the sealing bellows **8** forms a labyrinth seal together with the surface **A20** of the ball race **13**.

Regarding claim 14, the sliding ring **A1** is a shaped sheet metal part or a plastic molding. The sliding ring **A1** receives and holds a portion of the sealing bellows **8** between the axial extension **14** and the radial extension **16**. The axial extension **14** and

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the radial extension **16** are substantially perpendicular to each other. The ball race **13** is fixed to the ball pivot **2**.

Regarding claim 17, the pivot-side edge area **23** of the sealing bellows **8** forms a thickened material bead pressed against the ball race **13** or the sliding ring **A1** with an elastic pretension.

Regarding claim 20, the sliding ring **A1** has an approximately L-shaped cross section.

Regarding claim 23, the sliding ring **A1** is vulcanized directly to the pivot-side edge area **23** of the sealing bellows **8**.

Regarding claim 29, the lugs include free ends (the free ends are occupied by feature **27**; Fig. 3, or the free ends could be at the bent **15** in Fig. 4). The free ends face away from the ball pivot **2** in a radial direction (note that Figure 3 shows a free end does not face when free end is perpendicular to the ball pivot **2**, but when unassembled, the free end faces at an angle thus away). Alternatively, the bent at **15** also faces away from the ball pivot.

***Claim Rejections - 35 USC § 103***

Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yao, JP-2-199317, as applied to claims 1, 5, 9, 10, 12, 14, 17, 20, 23, and 29 above, and further in view of Gardner, 2,197,037.

Regarding claim 30, Yao, as discussed above, discloses the sliding ring **A1** having an L-shaped cross section comprising an axial leg **A50** (see marked-up attachment; second sheet of Yao) and a radial leg **A51**. However, the radial leg **A51** is not in sliding contact with an inner surface of the ball race **13**. Gardner shows, in Figures 2 and 3, a sliding ring **27** having an L-shaped cross-section comprising an axial leg **31** and a radial leg **30** in sliding contact with an inner surface of a ball race **26**, as part of an alternative configuration of slidably mounting a sealing bellows to a ball race such that the sliding ring 27 is not embedded in a sealing bellows. Therefore, as taught by Gardner, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the radial leg of the sliding ring of Yao in sliding contact with an inner surface of the ball race as part of an alternative design consideration for mounting a sealing bellows to the ball race without embedding the sliding ring embedded in the sealing bellows.

Regarding claim 31, given the modification above, the radial leg **A51** will be between the sealing bellows **8** and the lugs **28**.

**(10) Response to Argument**

102(b) rejection - Yao

Appellants argue Yao fails to show a sliding ring mounted to slide in a ball race that is fixed to the ball pivot. In response, it should be noted from the English translation that on page 7, in the third paragraph, Yao discloses "free sliding and rotation around the axis of the ball stud 2". Furthermore, the same paragraph discloses lubricant or grease is filled in the annular recesses 12 among the plural ring projections 11. It should be noted that these ring projections 11 are on the sealing bellows 8 and the recesses 12 are located between the projections 11 of the sealing bellows 8. Therefore, the sliding ring A1 as identified by the examiner, which is partially embedded in the sealing bellows, will rotate along with the sealing bellows.

Appellants further argue that Yao does not show the combination of a ball race having a leg that is in contact with the sliding ring with the leg comprising lugs arranged at spaced location from one another. This is not found persuasive because the ball race 13, which is mounted to the ball pivot 25, has a leg 15 that is in contact with the sliding ring A1 (see marked-up Figure 3). Further, the same leg 15 comprises lugs 28 spaced from each other as seen in the side view of Figure 4. Accordingly, the leg 15 is in contact with the sliding ring A1 and the leg 15 comprises lugs 28, i.e., the combination as being argued.



Appellants argue that the sealing bellows of Yao is touching at least three sides of the ball race 13 and thus cannot slide in the ball race. However, Yao teaches at page 7, third paragraph, that the lubricant in the recesses of the ring projections 11 of the sealing bellows 8 allows sliding and rotation between the bellows and the ball race. Appellants further argue that the sliding ring A1 is embedded is not mounted to slide within the ball race 13. However, the sliding ring A1 is embedded in the sealing bellows, and so therefore slides with the bellows when the bellows slides relative to the ball race 13.

Appellants further argue that the head section 28 is equivalent to lugs according to the rejection and thus is not in direct contact with the L-shaped embedded element. It should be noted that the rejection established feature 28 as the lugs and 15 as the leg as a whole. In response, this argument is not commensurate with the scope of the claimed invention. It should be noted that claim 1 broadly states "a leg is in contact with said sliding ring" and not the lugs being in direct contact with the sliding ring, which is recited in claim 28 and indicated as being objected to being allowable. It should also be noted that claim 1 does not recite an "L-shaped sliding ring". Appellants further argue the lugs are not arranged at spaced locations. This is not found persuasive because Yao shows, in Figure 4, four equally spaced apart lugs 28. Accordingly, Yao is a legitimate reference, which anticipates the claims.

103(a) rejection -Yao in view of Gardner

Appellants argue that Gardener fails to disclose a sliding ring mounted to slide in the ball race and a ball race having a leg comprising lugs spaced apart from each other. However, Gardner is not relied upon to show such structure since the sliding ring, the ball race, and the lugs are shown in Yao. Further, Gardner teaches the sliding ring mounted to slide in the ball race.

Appellants argue that there is no motivation to combine Yao and Gardner. In response, the examiner has clearly provided the motivation that one skilled in the art would modify the sealing bellows according to Yao so that the sliding ring is not embedded in the sealing bellows but instead placed so that the radial leg is in sliding contact with an inner surface of the ball race as Gardener has done.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

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For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Ernesto Garcia



Conferees:

Darnell M. Jayne



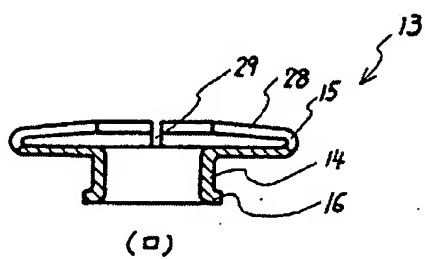
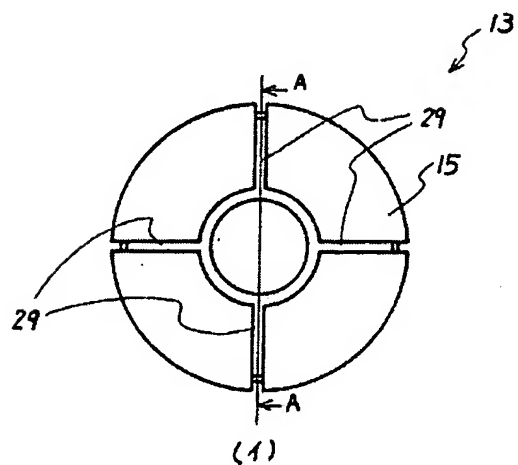
**GREGORY J. BINDA**  
**PRIMARY EXAMINER**

Gregory J. Binda

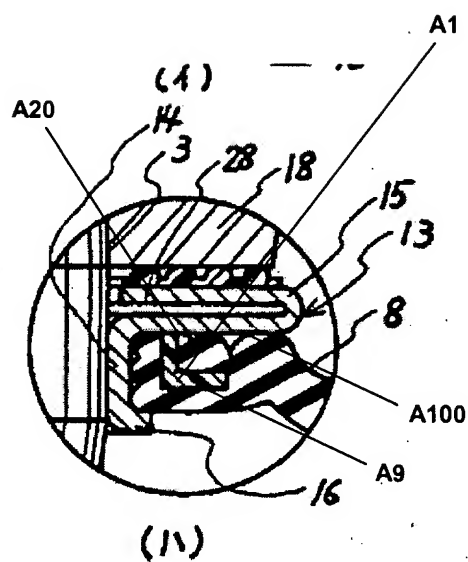


Attachments: Two-marked-up pages of Yao, JP-2-199317  
English Translation of Yao, JP-2-199317

Yao, JP-2-199,317.



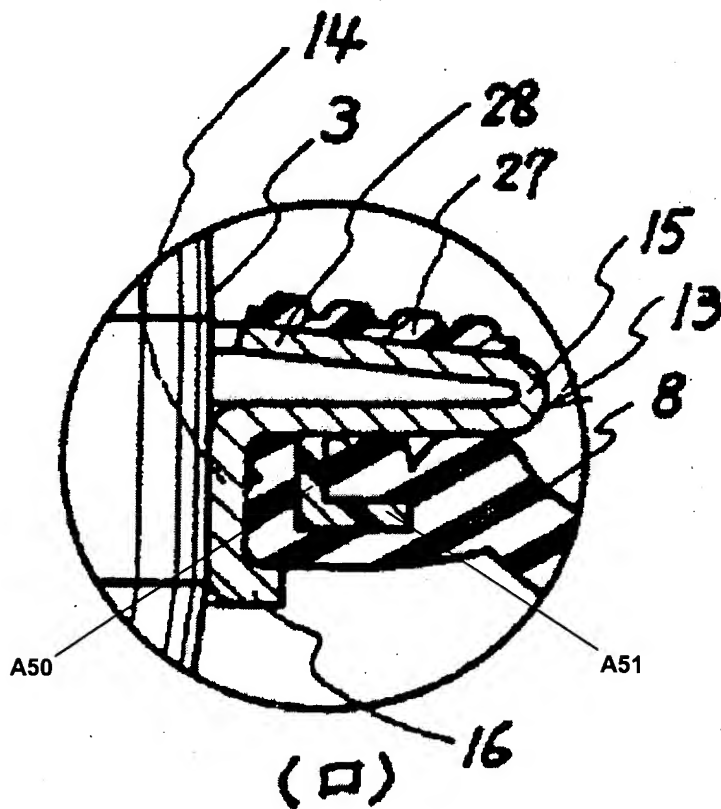
第 4 図



第 3 図

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Yao, JP-2-199317



PTO 06-6032

Japan Kokai

02-199317

SEAL STRUCTURE OF DUST COVER FOR BALL JOINT

(Boru Jointo yo Dasuto Kaba no Shiru Kozo)

Kyoichi YAO

UNITED STATES PATENT AND TRADEMARK OFFICE

Washington, D. C.

July 2006

Translated by: Schreiber Translations, Inc.

<u>Country</u>	:	Japan
<u>Document No.</u>	:	02-199317
<u>Document Type</u>	:	Kokai
<u>Language</u>	:	Japanese
<u>Inventor(s)</u>	:	Kyoichi YAO
<u>Applicant</u>	:	Musashi Seimitsu Industrial Co., Ltd.
<u>IPC</u>	:	F 16 C 11/06 F 16 J 15/52
<u>Date of Filing</u>	:	January 26, 1989
<u>Publication Date</u>	:	August 7, 1990
<u>Foreign Language Title</u>	:	Boru Jointo yo Dasuto Kaba no Shiru Kozo
<u>English Title</u>	:	SEAL STRUCTURE OF DUST COVER FOR BALL JOINT

## SPECIFICATION

## I. Title of the Invention

SEAL STRUCTURE OF DUST COVER FOR BALL JOINT

## II. Claims

1. A seal structure of dust cover for ball joint wherein a ring collar 13 consisting of a cylindrical body 14 and a flange 15 formed at one end of said cylindrical body 14 is fitted to a handle 3 of a ball stud 2 of a ball joint 1 connected to a connecting rod 18 so that said flange 15 is located opposite to the spherical head side, small apertures 9 at one end of a dust cover 8 are mounted at the periphery of said ring collar 13,

is characterized by the fact that

the head section 28 of flange 15 of a ring collar 13 is folded in such a way that its cross-section from roughly the center to a proper position opposite to the spherical head side becomes a nearly U shape, and a sealing member 27 made of a synthetic resin or a rubbery elastomer is provided between said ring collar 13 and a connecting rod 18.



<sup>1</sup>Numbers in the margin indicate pagination in the foreign text.

### III. Detailed Description of the Invention

#### = Purpose of the Invention =

The present invention relates to a seal structure of dust cover for ball joint used in, e.g., a suspension system and a steering system, etc. of automobile.

#### [Prior Art]

As shown in the left half of Fig. 1, a metal ring collar 113 having a cylindrical body 114 and a flange 115 and a collar 116 extending in the direction of outer diameter from both ends of the cylindrical body 114 and provided with a sealing member 127 for sealing between the flange 115 and a connecting rod 118 at the end face 117 of the flange 115 opposite to the spherical head side is pressed in and fixed to a handle 103 of ball stud 102 of a ball joint 101 connected to the connecting rod 118, small apertures 109 of a dust cover 108 are mounted to the periphery of the ring collar 113.

Japanese Unexamined Utility Model 63-160427 or the like /2 is given as such a seal structure of dust cover for ball joint.

#### [Problem to Be Solved by the Invention]

In the seal structure of dust cover for ball joint as described above, the sealing member 127 provided at the end face 117 of the flange 115 opposite to the spherical head side can

maintain high sealing ability for a long period of time because a space between the flange 115 and the connecting rod 118 is sealed by deformation due to pushing of the connecting rod 118 fitted to the handle 103 of ball stud 102.

However, said sealing member 127 deforms due to the pushing of connecting rod 118 over a long period of time, it hardens in its shape, when the diameter of a through-hole 130 of a new connecting rod 118 after replacement becomes smaller than that of a through-hole 130 of the old connecting rod 118 before replacement within a permissible range during replacement of the connecting rod 118, the connecting rod 118 after replacement cannot be inserted into the handle 103 of ball stud 102 until a position of the connecting rod 118 before replacement, a gap occurs between the connecting rod 118 and the sealing member 127, thus the sealing ability is lowered. Accordingly, it is considered that the ring collar 113 is moved up to prevent the occurrence of gap after removing the connecting rod 118 to solve the above problem. However, it can prevent the gap between the connecting rod 118 and the sealing member 127 but newly generates a gap between the handle 103 of ball stud 102 and the ring collar 113 when the ring collar 113 is moved up and thus causes a problem of lowering the sealing ability.

Accordingly, the purpose of present invention is to solve such a problem and provide a ball joint that maintains high sealing ability over a long period of time without lowering the sealing ability even in replacement of the connecting rod 118.

= Constitution of the Invention =

[Means for Solving the Problem]

A head section of flange 15 of a ring collar 13 is folded in such a way that its cross-section from roughly the center to a proper position opposite to the spherical head side becomes a nearly U shape, and a sealing member made of a synthetic resin or a rubbery elastomer is provided between the ring collar and a connecting rod.

[Example and Function]

An example of the present invention is described on the basis of the right half of Fig. 1.

1 is a ball joint, a spherical head 4 at one end of a ball stud 2 is pivoted with free sliding and rotation in a housing 6 via a bearing 5, and a handle 3 at the other end protrudes from a socket 6. The ball stud 2 is fixed by fastening a tapered part 24 of handle 3 to a connecting rod 18 with a nut 20. The connecting rod 18 is, e.g., a knuckle arm, etc. A ring collar 13 made of a corrosion-resistant material, e.g., stainless steel, is pressed in and fitted to a middle part 25 of the ball stud 2

The ring collar 13 consists of a cylindrical body 14 pressed in and fitted to the handle 3 of ball stud 2, a large-diameter flange 15 extending to its both ends in the direction of outer diameter and a small-diameter collar 16. Said flange 15 is located opposite to the spherical head side of the ball stud 2 and its cross-section from roughly the center in the peripheral direction to a proper position opposite to the spherical head side is folded into a nearly U-shape as shown in Fig. 2. A sealing member 27 made of a synthetic rubber or a rubbery elastomer is provided between the ring collar 13 and the connecting rod 18.

8 is a dust cover and is formed in a shape of roughly cylindrical bell with a rubber or a flexible plastic, etc. Plural ring projections 11 are provided to improve the sealing ability of the dust cover and the ring collar 13 and reinforced by embedding plastic annular fitting rings 23.

These small apertures have a proper tension force at the periphery of ring collar 13 and are mounted with free sliding and rotation around the axis of ball stud 2. Here, a lubricant such as grease, etc. is filled in an annular recess 12 among the plural ring projections 11 provided in the small apertures 9 of dust cover 8. A large aperture 10 of dust cover 8 is embedded into a an annular groove 26 formed at the periphery close to an

opening 7 of the housing 6, and a fastening ring 21 for preventing the detachment from the housing 6 is mounted at the periphery of large aperture 10. /3

A pull-stopping ring 21 for preventing looseness of the ball stud 2 is fastened by caulking at the inner periphery close to the opening 7 of housing 6.

Next, an assembly method and a seal structure of the ball joint as described above are illustrated.

First, the spherical head 4 of ball stud 2 surrounded by the bearing 5 is inserted into the housing 6 and the pull-stopping ring 21 is fastened by caulking at the inner periphery close to the opening 7 of housing 6 to assemble the ball joint 1.

Successively, the large aperture 10 of dust cover 8 mounted with the ring collar 13 at the inner periphery of one-end small apertures 9 is embedded into the annular groove 26 of housing 6, the pull-stopping ring 21 is further mounted to the periphery of large aperture 10, and the ring collar 13 is pressed into the handle 3 of ball stud 2 so that the flange 15 is located opposite to the spherical head side.

Subsequently, the sealing member 27 is arranged on the end face 17 opposite to the spherical head side of flange 15 whose head section 28 is folded in such a way that its cross-section

from roughly the center to a proper position opposite to the spherical head side becomes a nearly U shape, successively the connecting rod 18 is inserted into a tapered part 24 of the handle 3 of ball stud 2, fastened and fixed with the nut 20.

Accordingly, the sealing member 27 is pushed and the flange 15 ring collar 13 is compressed at the end face 19 of connecting rod 18 on the ball joint side, therefore the seal member 27 is pushed to the connecting rod 18, closely adhered and fixed by a reaction force returning the flange 15.

Here, after the handle 3 of ball stud 2 is inserted into the ring collar 13, said seal member 27 may be arranged on the end face 17 of flange 15 opposite to the spherical head side, but it may also be fastened to the ring collar 13 by a method of prebaking, etc.

Next, a state at the time of replacement of connecting rod 18 is illustrated on the basis of Fig. 3.

(2) of Fig. 3 shows a joined state of the connecting rod 18, sealing member 27 and ring collar 13 before replacement.

First, the nut 20 is removed from this state of embedding connecting rod 18, successively the connecting rod 18 is removed. If so, as shown in (1) of Fig. 2, the head section 28 of flange 15 of ring collar 13 which has been pushed against the

connecting rod 18 and compressed so far is move up with the sealing member 27.

Subsequently, as shown in (9) of Fig. 3, a new connecting rod 18 is inserted into the tapered part 24 of the handle 3 of ball stud 2, fastened and fixed with the nut 20.

Accordingly, when the diameter of a through-hole 30 of the new connecting rod 18 after replacement becomes smaller than a through-hole 30 of the old connecting rod 18 before replacement within a permissible range, even if the connecting rod 18 after replacement cannot be inserted into the handle 3 of ball stud 2 until a position of connecting rod 18 before replacement, a gap does not occur between the connecting rod 18 and the sealing member 27 due to an elastic effect of the flange 15 of ring collar 13.

In order to improve the productivity of ring collar 13 of the above example, as shown in Fig. 4, a notch 29 may also be formed in the head section 28 of flange 15 beforehand. In this case, however, as shown in Fig. 5, the sealing member 27 must be provided so as to cover the entire notch 29 to prevent infiltration of water from the notch 29.

#### [Effects]

As described above, the head section of flange of ring collar is folded in such a way that its cross-section from

roughly the center to a proper position opposite to the spherical head side becomes a nearly U shape, and a sealing member made of a synthetic resin or a rubber elastomer is provided between the ring collar and the connecting rod, therefore the sealing ability is increased due to the elastic force of flange of ring collar, when the diameter of a through-hole of the new connecting rod after replacement becomes smaller than a through-hole of the old connecting rod before replacement within a permissible range, even if the connecting rod after replacement can-not be inserted into the handle of ball stud until a position of connecting rod before replacement, the permissible range for bringing the through-hole of connecting rod and the tapered section of ball stud into contact is increased due to the elastic effect of the flange of the ring collar, a gap does not occur between the ring collar and the connecting rod and thus a high sealing ability can be maintained over a long period of time.

#### IV. Brief Description of the Drawings

Fig. 1 is a sectional front view showing a conventional seal structure of dust cover for ball joint in its left half and showing a seal structure of dust cover for ball joint based on the example of the present invention in its right half. Fig. 2



is a sectional front view of a ring collar. Fig. 3 is an enlarged view of T part of Fig. 1 shown by Fig. 1(2) to Fig. 1(9) in order. Fig. 4 shows another example of the ring collar, Fig. 4(2) is a plane view and Fig. 1(9) is an A-A sectional view of Fig. 4(2). Fig. 5 is a sectional front view showing a state of providing a sealing member for the ring collar shown in Fig. 4.

(Description of the Symbols)

1	}}	ball joint
2	}}	ball stud
3	}}	handle
8	}}	dust cover
9	}}	small aperture
13	}}	ring collar
14	}}	cylindrical body
15	}}	flange
18	}}	connecting rod
27	}}	sealing member

Fig. 1

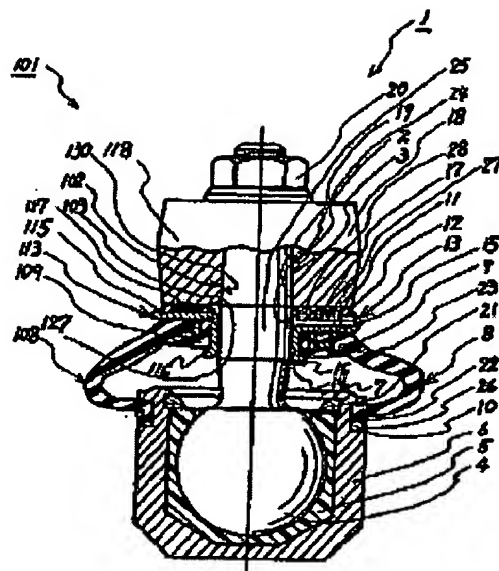


Fig. 2

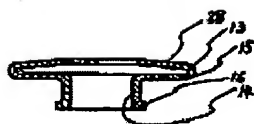


Fig. 3

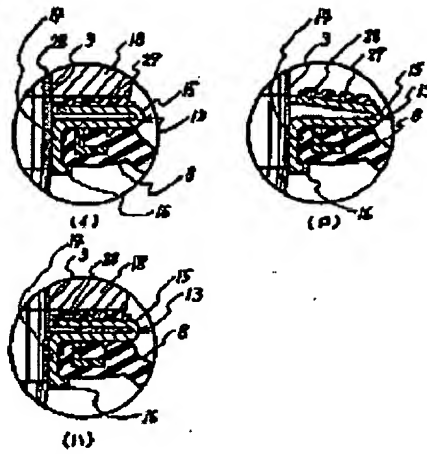


Fig. 4

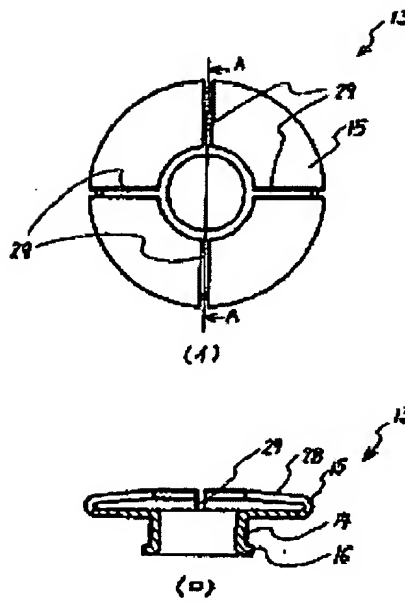


Fig. 5

